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# ELIMINATION OF ROAD HAZARDS

By BROWN and LYNCH

**M**ETHODS of transportation have changed greatly since the days of our grandfathers when the now antiquated buggy propelled by a skinny nag was in vogue. As one rolls leisurely along in his up-to-date car, utilizing one of the countless pathways at his disposal, he scarcely realizes the improvements in present day transportation over the facilities of a generation ago. With these advancements have come many additional hazards to the traveling public.

The orderly planning of metropolitan thoroughfares will do much toward alleviating traffic congestion and minimizing accidents in urban districts. The construction of safe thoroughfares is expensive, but the expense is small compared with the value of the lives lost through unsafe road conditions, and the resulting tremendous cost of congestion and delay.

Traffic can move no faster than its speed at intersections and it is evident that a street is no safer than those same intersections. At the end of many wide boulevards bringing traffic from one district to another there is no provision for the absorption of such a volume of traffic.

Because of this fact, every intersection along the route becomes a constant source of danger. Intersections that appear the most dangerous are often the safest, as motorists proceed more cautiously through them. The most hazardous ones are those which, although dangerous, appear to be safe. More and more the realization is being driven home to us that super highways are a necessity, not a luxury.

With an adequate transportation system, congestion can be further relieved by decentralization of population. Considering that the state of Kansas is large enough to house the entire population of the world at a reasonable density of ten families to the acre there is little reason to crowd people into unsanitary, congested areas, that breed slums and delinquency. Improved transportation facilities can help to eliminate the necessity for these overcrowded areas by moving the bulk of their population to suburban districts.

The construction of elevated thoroughfares would do much to eliminate dangerous intersections and would also provide for the speedy passage of cross-town traffic.

Slower local traffic would be completely barred from these speedways and routed along streets which could cross the main thoroughfares only by a series of underpasses. An adequate corps of well-trained traffic officers with no "ticket fixing" would complete the picture.

Annually grade crossings claim their share of traffic fatalities. The public has long known that steps should be taken to eliminate grade crossings, but underpasses and overpasses are expensive structures. Neither the railroads nor the highway departments could stand the expense of crossing elimination. Consequently the decision of the Federal government to provide relief expenditure grants for this purpose was welcomed by everyone interested in highway safety. In 1935 alone four hundred and eighty crossings were eliminated.

At dangerous railroad crossings these projects have, for the most part, taken the form of underpasses. As was said before, these underpasses are expensive, so when a crossing is under consideration for improvement, engineers must determine just what form of improvement is most feasible. If the volume of traffic on both highway and railroad is large, and the accident possibilities are great, an underpass is usually justified. Improvement may also take one of four other forms: closing of crossing and diversion of highway traffic to other crossings; relocation of existing highways; installation of proper protection; installation of warning signs only. It is the duty of the highway engineer to make a thorough study of the crossing and decide what course to follow.

As the speed of motor traffic increases, curves which only a few years past were entirely adequate are now completely outmoded. In the interests of the safety of our motoring public these curves must be replaced by other curves with greater radii, sufficient super-elevation and reasonable spiral easements.

The grade that must be incorporated into a highway is, for the most part, determined by the character of the country. In some cases, it may be advisable to change the grade in order to eliminate a dangerous curve. As a general rule, grades should not exceed 5 per cent, but in mountainous country a grade of 8 per cent may be permissible if it is compensated and does not continue for more than three thousand feet. Unexpected grade changes constitute a serious hazard, and their elimination is a matter that justifies very careful consideration.

A surprising number of automobile accidents occur when two parties try to negotiate a one-lane bridge at the same time. These bridges are gradually being replaced by modern structures which eliminate this hazard and will be more than adequate for years to come.

One of the most important properties of a road surface is its skid resistance. Operation of a car is made possible by the friction provided between the tire and road surface. It is friction which also makes it possible to stop the car. It is friction which makes it possible to steer safely around curves and corners. The greater this frictional force, the easier it becomes to steer the car

and the quicker it becomes possible to stop it. This is the reason it is necessary to provide good frictional resistance in the surfaces of new roads and to treat existing surfaces so as to maintain a skid resistance quality.

Tests conducted by the experiment stations of Ohio State University and Iowa State University have resulted in the following findings:

- a. Adhesion between tire and road varies inversely with the speed of the vehicle.
- b. A light sprinkle causes the average road to become much more slippery than does a drenching rain.
- c. Speeds above 20 or 30 miles per hour are unsafe upon wet pavements.
- d. When the brakes are applied, sliding the wheels causes an automobile to travel much farther before it is brought to a stop.
- e. Smooth tires almost double the tendency of wheels to slide when brakes are applied.
- f. Increasing or decreasing tire pressure on ice or snow does not help traction.

Portland cement road surfaces are the most consistent of all present road material from the standpoint of skid resistance. A liberal amount of clean, sharp sand is used in the mix, and the cement is finished by brooming, thus the greatest possible skid resistance is obtained.

"Black top" surfaces can be made more skid resistant by applying heated sand, screenings, or road chips uniformly over the surface and rolling it with a moderately heavy roller. Brick surfaces can be made more skid resistant by removing the excess filler which has bled from the joints. Snow and ice can be handled quite effectively by liberal application of cinders or hot sand. Small amounts of calcium chloride can be added, but too much of it has a tendency to damage cement.

Although four-fifths of all traffic is during the daylight hours, statistics show that automobile fatalities at night are steadily increasing, while daytime deaths are decreasing. Dark highways constitute a hazard, and danger spots should be eliminated by illumination. Up until 1936 the public was not willing to consider illumination as a safety measure, but as a result of surveys conducted by insurance companies proving that proper illumination can cut night accidents in half, highway departments began experimentation. Results of these investigations were gratifying to say the least. An excellent example of this experimentation is the Mount Vernon Memorial Highway leading into Washington, D. C. When lighting was discontinued along this route, accidents increased almost 250 per cent. When all lights were turned out, 22 night accidents were recorded over a six month period while the preceding year, with lights on, only 9 night accidents were recorded.

Perhaps the greatest cause of automobile accidents is the man behind the wheel. No amount of safety engineering can protect the careless driver from himself. However, a more rigid system of law enforcement would do much toward keeping this type of driver off the road.